



8. FLORA AND FAUNA

What is man without the beasts? If all the beasts were gone, men would die from a great loneliness of the spirit. For whatever happens to the beasts soon happens to man.⁶

8-1 Flora

Fort Wainwright encompasses a large amount of land with a wide array of physiographic features. Vegetation patterns are influenced by climate, soil, topography (slope, aspect, and elevation), depth to water table, permafrost, and fire. Native vegetation was removed from much of the Main Post during original construction of Ladd Field in the 1940s. Due to landscaping and other human activities, vegetation of the Main Post does not reflect natural vegetation patterns of the area (Nakata Planning Group, 1987).

Fort Wainwright has four vegetation types: moist tundra; treeless bogs; open, low-growing spruce forests; and closed spruce-hardwood forests. The white spruce-paper birch forest of interior Alaska is often called the boreal forest, or taiga. Vegetation types of interior Alaska form a mosaic and reflect fire history, slope and aspect, and presence or absence of permafrost (Viereck and Little, 1972).

8-1a Vegetative Profile

A typical vegetation profile from lowland, up a south slope, and down the north slope, would include the

⁶Chief Seattle, 1954

following; water, barren, high brush, deciduous forest, white spruce forest, moist tundra, black spruce forest, and mixed forest (Bonito, 1980). This profile does not precisely match Viereck and Little's (1972) vegetation types, which were mapped on a statewide scale. Wetland occurs at various altitudes, and sometimes only during early successional stages. Localized conditions often result in various combinations of vegetation.

Barren Land: Barren ecosystems on Fort Wainwright are recently deposited gravel bars in rivers.

High Brush: The high brush ecosystem exists as a transitional zone, or ecotone, between forests and barren areas or tundra. It normally is a narrow vegetation band along floodplains or just above tree line. The size of the transitional zone varies dramatically, and in places where there is a well-defined tree line, it may be quite small. The high brush area, however small, is important ecologically. It sustains small to medium-sized woody plants and shrubs (no higher than 20 feet), including alder (*Alnus* sp.), willows (*Salix* sp.), cottonwood (*Populus* sp.), birch (*Betula* sp.), mountain ash (*Sorbus* sp.), and prostrate white spruce (*Picea glauca*). Along floodplains, high brush forms a thick, almost impenetrable barrier. There is little or no ground cover. In subalpine settings, stands may be thinner and more persistent. Ground vegetation is grasses, mosses, small shrubs and forbs, and lichens that often form thick layers. A mixture of wildlife from the alpine and forested communities uses the area. The high brush ecosystem is particularly important for moose forage (Bonito, 1980).

Forests: Forests are dominant, diverse ecosystems on Fort Wainwright. Vegetation ranges from pure stands of spruce or hardwoods to spruce/hardwood mixtures. Black spruce (*Picea mariana*) stands are found where drainage is poor, such as flat valley bottoms, lakesides, and muskegs. White spruce (*P. glauca*) stands are rare due to anemic soils and frequent wildfires. Pure stands of paper birch (*Betula papyrifera* var. *humilis*) and quaking aspen (*Populus tremuloides*) are commonly found in well-drained uplands and ridge tops. Most forests are heterogeneous mixtures of spruce (white and black) and hardwoods. Predominant hardwoods are birch, quaking aspen, and balsam poplar (*P. balsamifera*). Higher, well-drained ridges tend toward stands with a white

spruce/birch mixture in early stages leading to pure spruce at the climax stage. In other areas, aspen forms a canopy over an understory of white spruce. Bottomland white spruce/balsam poplar forest occurs on level floodplains, low river terraces, and south slopes. White spruce is dominant and reaches a height of 110 feet. Stands may persist for 50 to 200 years before being replaced by black spruce. Moss gradually accumulates as the forest ages. The deep mat insulates the permafrost below and prevents summer thaw, giving rise to wetter conditions that favor black spruce. Lowland black spruce/hardwood is the most common forest type in interior Alaska. On colder, northern aspects, black spruce may occur up to 2,500 feet (Bonito, 1980).

Moist Tundra: Moist tundra occurs on top of Fort Wainwright hills at 2,500 to 3,000 foot elevations. This windy and cold area is above tree line and supports only the hardiest vegetation in a short growing season. Upper reaches of this zone are generally steep and rocky. Vegetation is sparse-scattered grasses, dry land sedges, lichens, club mosses, and low mat-forming herbaceous and woody plants. Woody perennials rarely exceed three feet in height. This vegetation type is extremely sensitive to damage (Bonito, 1980).

Wetland: On Fort Wainwright, wetland can be divided into marshes and shrub wetland. Much of TFTA is covered by treeless, herbaceous marsh. These marshes are unique in that they are largely dependent upon groundwater discharge and usually develop as floating vegetation mats over deeper water. The floating mat consists of a dense network of roots and organic material of variable thickness. Standing water may or may not be present on top of the undisturbed mat and may or may not be moving. Dominant mat-forming plants are graminoid sedge, grass and horsetail species, and herbaceous broadleaf forbs, such as buckbean (*Menyanthes trifoliata*) and marsh marigold (*Caltha palustris*). In addition, submerged aquatics, such as bladderwort (*Utricularia* sp.), and floating aquatics, such as duckweed (*Lemna* sp.), are frequently found in these areas. Trees and shrubs are absent, except for occasional willows (Racine et al., 1990). These wetlands attract large numbers of trumpeter swans and other waterfowl. Williams (1994) studied vegeta-

tion patterns in the Tanana Flats wetland complex. Her report includes plant species data from five survey plots and relationships among these species.

Shrub wetland, also known as bogs, muskeg, and low brush, are associated with slightly higher relief on the edges of marshes, and in poorly drained basins and depressions with cold, waterlogged soils. The surface consists primarily of a thick layer of peat over a mottled, gray silt or silt loam. The water table, if not exposed, is found only a few inches down. During periods of heavy precipitation, bogs may form temporary lakes. Depth to ice-rich permafrost is often less than 30 inches. Ground cover is characterized by dense accumulation of mosses, lichens, sedges, rushes, liverworts, mushrooms, and other fungi. Stunted black spruce occasionally appears. Along margins of bogs and in drier areas, grasses, small shrubs, berries, and woody plants, such as willow and dwarf Arctic birch (*Betula nana*), proliferate (Bonito, 1980).

The interaction of soils, permafrost, and vegetation on lowland sites results in a dynamic mosaic of ecosystems. Dead and falling trees along the boundary between marsh and forested upland or forested islands suggest massive permafrost thaw and subsidence. Heat is transferred from marsh water to the permafrost, with subsequent melting and subsidence of the upland surface. This results in shrinkage of forested islands and uplands. Conversely, forested islands may expand through a rising of the permafrost table. This results in the rise of the peat above the water level, improving drainage, and allowing trees to become established (Racine et al., 1990).

Fire plays a significant role in forest development. More than 100,000 acres have burned on Fort Wainwright since 1980. White spruce stands may persist for 200 years in the absence of fire. Alternatively, over a 60-year period, a burned stand can progress from willow to aspen/birch to white spruce/birch, and eventually to a mature black spruce forest. Wet muskeg sites may recover to complete vegetative cover in 3-5 years, while lichens may take 50-100 years. Single fire events in a white spruce/hardwood stand may perpetuate white spruce/birch communities, while repeated fires result in birch/aspen communities (Bonito, 1980).

8-1b Ecological Land Classification

Ecological Land Classification is a hierarchical means to classify land according to various ecological scales. This study evaluated three of eight spatial scales for mapping ecosystems: ecosites, ecodistricts and ecosubdistricts.

A pilot ecological land survey was completed on an area (200 km² [78 miles²]) near Clear Creek on Fort Wainwright by CRREL (Jorgenson and Smith, 1995). This study indicated 20 ecosites, 12 ecosubdistricts, and five ecodistricts in the Clear Creek study area. For each 100 kilometers² (39 miles²), ecodistrict delineation required 1.3 hours; ecosubdistrict delineation required 20 hours; and ecosite delineation required 135 hours. This study provides options for mapping Fort Wainwright ecosystems using the most appropriate scale in terms of cost/benefits. See Section 12-2d(1) for a description of the project to complete this land classification for Fort Wainwright. The LEIS for the YTA land withdrawal renewal (Center for Ecological Management of Military Lands, 1998) contains a description of the 32 ecosites, four ecosubdistricts, and one ecodistrict on YTA.

8-1c Floristics Inventory

Floristics inventory activities set the foundation on which many decisions regarding land management are based. Inventories can range in intensity, based on their goals and objectives. The following lists the goals for Fort Wainwright's floral inventory:

- ▶ Identify flora at Fort Wainwright
- ▶ Establish baseline data for the ITAM program
- ▶ Establish voucher museum mounts to be used for future reference
- ▶ Identify rare, threatened, or endangered plants, or other species that may be of special interest

During 1995-1996, CRREL conducted a floristic inventory for USARAK at Fort Wainwright (Tande et al., 1996). The inventory focused on vascular plants, so cryptogams (*i.e.* mosses and lichens) were not identified. The inventory found 491 taxa (in-

cluding subspecies and varieties), representing 227 genera in 72 families. This is about 26% of Alaska's vascular flora. At least 10 taxa collected represented extensions of known ranges (Tande et al., 1996).

Plants were collected from five units within the Tanana Flats of the Tanana-Kuskokwim Lowland, three units of the Yukon-Tanana Upland, and the Cantonment Area. A total of 1,005 collections were made at 123 sites within these units. CEMML mounted and laminated three sets of collected plants. One set remains at Fort Wainwright, and the other two are stored at the University of Alaska Museum, Fairbanks and the University of Alaska, Anchorage.

All established goals have been met by the 1995-1996 inventory. There are no plans for additional

plant inventories over the next five years. Additions to the floristics inventory will occur as new plants are identified, usually through the LCTA monitoring program.

8-1d Threatened or Endangered, and Species of Concern Plants

No federally-listed endangered, threatened, or candidate plant species were found in the floristic inventory or any other survey on Fort Wainwright. This was expected because there are no listed or candidate species native to interior Alaska. Twelve species collected by Tande et al. (1996) were vascular plants being tracked by the Alaska Natural Heritage Program's Biological Conservation Database for interior Alaska (see Table 8-1d).

Table 8-1d. Global and Alaska Rankings for plants found on Fort Wainwright

Species	Common Name	Global Ranking*	Alaska Ranking**
<i>Alisma triviale</i> ***	water plantain	G5	S2
<i>Artemisia laciniata</i>	laciniate sagewort	G5	S2
<i>Carex crawfordii</i>	Crawford's sedge	G5	S2S3
<i>Ceratophyllum demersum</i>	coontail	G5	S1S2
<i>Cicuta bulbifera</i>	bulblet-bearing water hemlock	G5	S1S2
<i>Cryptogramma stelleri</i>	fragile rock-brake	G5	S2S3
<i>Dodecatheon pulchellum</i> ssp. <i>pauciflorum</i>	pride of Ohio	G5T5Q	S2
<i>Lycopus uniflorus</i>	northern bugleweed	G5	S3
<i>Oxytropis tananensis</i>	standing milkvetch	G3	S3
<i>Rorippa curvisiliqua</i>	curvepod yellow crest	G5	S1
<i>Rosa woodsii</i>	Wood's rose	G5	S1S2
<i>Syntheris borealis</i>	Northern kittenstails	G3G4	S3S4
<p>* Alaska Natural Heritage Program Rare Species Global Rankings</p> <p>G3 Either very rare and local throughout its range or found locally in a restricted range (typically 21-100 occurrences)</p> <p>G4 Apparently secure globally</p> <p>G5 Demonstrably secure globally</p> <p>G#Q Taxonomically questionable</p> <p>G#G# Global rank of species uncertain; best described as a range between the two ranks</p> <p>** Alaska Natural Heritage Program Rare Species State Rankings</p> <p>S1 Critically imperiled in state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state (typically 5 or fewer occurrences, or very few remaining individuals or acres)</p> <p>S2 Imperiled in state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state (typically 6 to 20 occurrences, or few remaining individuals or acres)</p> <p>S3 Rare or uncommon in the state (typically 21-100 occurrences)</p> <p>S4 Apparently secure in state, with many occurrences</p> <p>S#S# State rank of species uncertain; best described as a range between the two ranks</p> <p>*** Center for Ecological Management of Military Lands (1998)</p>			

In addition to the above, three species found on YTA are major range extensions of more than 90 miles (*Alisma triviale*, *Drosera anglica*, and *Hammarbya paludosa*) (Center for Ecological Management of Military Lands, 1998).

No further inventories for threatened or endangered, and species of concern plants will be conducted in the next five years. Plants that are being tracked by Alaska's Natural Heritage Program will be mapped using a Global Positioning System (GPS).

8-1e Forest Inventory

A forest inventory is an integral part in establishing a plan for managing forest resources. Such an inventory was sponsored by BLM and completed by Tanana Chiefs Conference (1993) with assistance from the State of Alaska Division of Forestry. The following goals were established to direct inventory activities:

- ▶ Distinguish between forested and non-forested lands
- ▶ Identify forested lands that have or may have commercial potential
- ▶ Determine acreage of potential commercial timbered lands

- ▶ Map forested areas

- ▶ Determine the commercial potential of these lands

The inventory included the Main Post, the periphery of the TFTA, Eielson AFB, and YTA, excluding closed areas. Total land area considered for forest management was 325,169 acres for the Main Post and TFTA, and 290,308 acres on the YTA unit. Forty-eight percent of the Tanana Flats unit (156,927 acres) and 75% of the YTA unit (217,751 acres) were classified as forested land, indicating areas with commercial forestry potential. The remainder was classified as non-forest land, rivers, or water. Most of the survey was done using aerial photos and very little groundwork. The minimum mapping unit was approximately 15 acres. Sawtimber was defined as conifers greater than nine inches diameter at breast height (dbh) and deciduous trees greater than 11 inches dbh. Pole timber was defined as conifer 5-9 inches dbh and deciduous tree 5-11 inches dbh. Table 8-1e summarizes results of this survey in terms of commercial timber available on Fort Wainwright.

Potential annual harvest levels were calculated using the area control method with the following assumptions:

Table 8-1e. Timber Resources on Fort Wainwright (Tanana Chiefs Conference, 1993)

Unit	Species	Acreage	Area %	Volume*	Volume %
TFTA	Sawtimber				
	White Spruce	5,240	11.4	56.06 mil	27.2
	Balsam Poplar	1,777	3.9	5.15 mil	2.5
	White Spruce/Hardwood	1,217	2.7	11.686 mil	5.7
	White Spruce/Balsam Poplar	3,954	8.6	48.241 mil	23.3
	Total Sawtimber	12,188	26.6	121.142 mil	58.7
	Pole Timber				
	White Spruce	1,174	2.6	5.05 mil	2.4
	Balsam Poplar	3,578	7.8	4.65 mil	2.3
	Hardwood	10,547	23.0	11.602 mil	5.6
	White Spruce/Hardwood	5,309	11.6	18.05 mil	8.7
	White Spruce/Black Spruce	2,086	4.6	2.503 mil	1.2
	White Spruce/Balsam Poplar	5,259	11.5	32.606 mil	15.8
	Black Spruce/White Spruce/Hardwood	5,649	12.3	10.732 mil	5.3
	Total Pole Timber	33,602	73.4	85,196 mil	41.3

Unit	Species	Acreage	Area %	Volume*	Volume %
YTA	Sawtimber				
	White Spruce	526	1.0	5.625 mil	5.2
	Balsam Poplar	16	0.0	.047 mil	0.0
	White Spruce/Hardwood	61	0.1	.581 mil	0.5
	White Spruce/Balsam Poplar	612	1.1	7.470 mil	6.9
	Total Sawtimber	1,215	2.3	13.722 mil	12.6
	Pole Timber				
	White Spruce	470	0.9	2.020 mil	1.9
	Hardwood	24,437	45.4	26.881 mil	24.7
	Balsam Poplar	70	0.1	.092 mil	0.1
	White Spruce/Hardwood	8,881	16.5	30.195 mil	27.7
	White Spruce/Black Spruce	1,212	2.3	1.455 mil	1.3
	White Spruce/Balsam Poplar	279	0.5	1.729 mil	1.6
	Black Spruce/White Spruce/Hardwood	17,307	32.1	32.882 mil	30.2
	Total Pole Timber	52,656	97.7	95.253 mil	87.4

*Board Feet

- ▶ White spruce, birch, and aspen are crop species; balsam poplar, black spruce, and tamarack are likely to remain non-marketable in the near future
- ▶ Regeneration of softwoods and hardwoods can be quite variable, but it is estimated that 10 years will be required for trees to become established and reach “free to grow” status
- ▶ The estimated annual allowable harvest is based on present average net volumes
- ▶ White spruce sawtimber can be produced in 120 years; hardwood sawtimber and fuel wood can be produced in 80 years

Based on inventory data and above assumptions, 229 acres/year of white spruce sawtimber could be harvested from the Tanana Flats, yielding 324,000 cubic feet or 1,282,000 board feet. Potential hardwood harvest was 251 acres/year, yielding 152,000 cubic feet or 601,432 board feet. For the YTA unit, potential annual harvest level of white spruce sawtimber was 123 acres/year, yielding 92,000 cubic feet or 340,000 board feet. Potential hardwood harvest was 317 acres/year, yielding 183,000 cubic feet or 676,304 board feet.

Potential harvest may not be actual harvest. Ecosystem management of forests on Fort Wainwright dictates that considerations other than purely com-

mercial, such as wildlife values, are investigated prior to cutting timber.

8-1f Forest Stand Types— Characteristics and Potential Use

The status of Fort Wainwright forests was summarized in a draft forest management plan for the post (1993 unpublished report) - “... *forests are overmature and on the decline in many areas in terms of productivity and disease. In addition, crown closure in many upland stands is near 100%. Stands are densely stocked resulting in suboptimum growth rates which suppress development of understory trees. Without appropriate management, renewable forest resources are being lost on training lands.*”

The following sections summarizes the 1993 draft forest management plan for Fort Wainwright, which describes important forest stand types and discusses their potential use.

White Spruce Type

White spruce is the climax species for much of interior Alaska as well as Fort Wainwright. Generally occurring on well-drained upland sites, white spruce is rarely found on water-logged sites or extremely dry, sunny slopes. On north and east-facing slopes, white spruce is confined to drainage ways and tops

of slopes. The presence of either aspen or cottonwood in a spruce stand is often an indicator of commercial forest land. Although pure stands occur along the Tanana River, white spruce is more commonly found within mixed deciduous stands. In time, white spruce dominates these sites. Whether or not white spruce forms a climax stand in the absence of fire is unclear. Although the desire may be to manage for a single stand type, mixed stands are the natural conditions on most sites.

Early succession stage forests and mixed stands are important to moose. Many neotropical migratory birds also require early successional stages for nesting and foraging. Some species nest in "shrubby" thickets and require a hardwood component. On the other hand, some species require dense stands of young conifers. Silviculture practices to obtain and maintain mixed stands are ideal for most wildlife species. Potentially, anything done to favor white spruce will also favor hardwood establishment.

On good sites along the Tanana River, white spruce averaging 16 to 18 inches dbh at less than 150 years of age is not uncommon; some trees in such stands exceed 24 inches dbh at 125 years. Mature trees usually do not exceed 85 to 100 feet in height. On upland sites, mature white spruce commonly range from 14 to 18 inches dbh, and on the best sites, trees can produce spruce 15 to 16 inches dbh by 50 years of age. White spruce is highly valued for house and sawlogs and, to a lesser degree, firewood.

Paper Birch Type

Paper birch is widely distributed in YTA uplands and to a lesser degree in the TFTA. Maximum heights seldom exceed 80 feet, and more frequently, they are about 70 feet at 50 years of age. Most stands are even-aged except when overmature. Overmature paper birch commonly range from 12 to 16 inches dbh, and some decadent stands have trees over 18 inches. Fungal conks have weakened many trees, an indication of internal decay.

Following tree harvest, birch can naturally regenerate, but not as readily as aspen. Tree distribution is limited by stem density and distribution of the harvest stand. Seeding regeneration is often necessary to produce adequately stocked stands. Birch produces large quantities of seed that can disperse for long distances; thus clear cutting is one option. A

key aspect of birch regeneration is seedbed condition. Mineral soil seedbeds are best, where seeds may remain viable in the soil for up to a decade. Birch normally occurs on all exposures, except northern slopes, and can tolerate sites underlain by discontinuous permafrost. Birch wood is considered by many to be the best firewood in Alaska. In its browse stage, birch has value to wildlife. It has potential as veneer or pulp manufacturing when mature.

Quaking Aspen Type

Aspen is predominantly limited to uplands of YTA on relatively dry southern or southwestern exposures. Dense stands mature after approximately 60 years of age and begin to open up. Maximum height in mature pure stands seldom reaches 60 feet. Aspens commonly reach 10 to 11 inches dbh, and some sites support older trees to 18 inches dbh. The most vigorous stands occur on warm, dry slopes since aspen can tolerate very arid conditions that other tree species cannot. It is almost completely absent from cold, wet, northern slopes and lowlands where black spruce dominates.

Aspen characteristically produces abundant root suckers that grow rapidly and form dense patches surrounding killed trees following manual clearing or fire. Aspen can dominate a site within a few weeks following a fire and is readily managed by clear cutting and vegetative reproduction.

While aspen has limited value as fuel wood, it is an important habitat and food source in younger succession stages, particularly to moose and ruffed grouse on YTA. Aspen commercial values could increase if an interior Alaska pulpwood industry develops.

Balsam Poplar Type

Balsam poplar stands are found along alluvium deposits of the Tanana River in TFTA and bottomlands of smaller floodplains in YTA. Trees can reach diameters of 48 inches and on the best sites can be more than 20 inches dbh at 30 years of age. This species is well adapted to river bars, stream bends, and lake shores, and may form nearly closed stands. As the height of river terraces increases, flooding becomes less frequent, allowing white spruce to establish and increase in size and density. Eventually, white spruce becomes codominant, and balsam pop-

lar shows signs of decline. Aspen is a rare associate, and sometimes birch is a minor associate. Occasionally, balsam poplar regenerates on upland burns and is usually replaced by white spruce in the long-term succession sequence.

Timber values for balsam poplar are not high. Utilization is limited to low-grade saw lumber and firewood.

Black Spruce Type

Black spruce stands cover vast areas of the landscape on Fort Wainwright. Stands are usually found on poorly-drained sites and where permafrost is near the soil surface. Sites are cold, wet and poorly aerated, often due to deep continuous mats of moss that insulate the permafrost below and prevent summer thaw. Stands of this type are generally encountered in relatively flat valley bottoms or on flat to gently rolling land on northern exposures. Permafrost often limits other types of vegetation. Higher, dry hummocks may support islands of hardwoods, and lower wet sites can support tamarack or willow. Stand densities on better sites are high, and trees are of even height, rarely exceeding 10 to 11 inch dbh. Pure stands of short, narrow-crowned black spruce are common around lake and bog margins on TFTA and YTA.

Black spruce stands are treatable with tree crushing equipment or hydro-ax cutting to stimulate reproduction and growth of willows, aspen, and other browse species. Prescribed burning remains a viable option to return stands to the shrub/herb stages of succession. Utilization of black spruce is similar to that of white spruce if tree sizes and stands volume permit. However, commercially significant stands on Fort Wainwright are marginal.

Brush Type

Permanent brush fields occur at high mountain elevations, in small stream valley bottoms, and on disturbed sites, as pioneer vegetation. These areas are occupied by alder, willow, and dwarf birch. There is little evidence that commercial forest stands ever have or will occupy high elevation sites. The presence of scattered krummholz spruce, either in the brush fields or bordering them, is evidence that the land will not support commercial forest growth. Thickets of willow and alder along floodplains or

disturbed sites often form dense thickets for 10 to 20 years. Alder is often associated with disturbed sites, such as gravel pits, road shoulders, rights-of-way, and military trails.

Alder provides important cover for a variety of wildlife and plays a significant role in fixing nitrogen. Early succession willow stages are important moose habitats and can be relatively productive. Annual biomass production of 43 to 86 cubic feet per acre in 5 to 20 year-old alder/willow stands on floodplains have been reported.

8-1g Wetland

Wetland on Fort Wainwright consists of freshwater marshes and shrub wetland. Some wetland may qualify as jurisdictional wetland as defined in Section 404 of the Clean Water Act. Jurisdictional wetland is determined by the Army Corps of Engineers, Anchorage District Office, on the basis of hydric soils, vegetation, and hydrology. Fort Wainwright has two wetland surveys completed or near completion: the National Wetlands Inventory (NWI) and the ongoing WES inventory, as discussed in 12-2b.

The NWI for Fort Wainwright was completed in 1992. The NWI included 100% coverage of 11 of 14 map quads with less than 100% inventory of the other three quads. NWI results were digitized by CEMML in 1997 (Figure 8-1g). Some smaller wetlands and those obscured by dense forest cover may not be included in this inventory, which renders this survey inadequate for installation natural resources management programs.

8-2 Fauna

Most species indigenous to central Alaska can be found on Fort Wainwright. Two important components of animal life on the installation are a high quality moose population and a concentration of waterfowl. A list of verified species is in Appendix 8-2. The *Fish and Wildlife Management Plan* for Eielson AFB (Von Reuden, 1994) was used to help develop the list.

8-2a Big Game

ADF&G designates black bear (*Ursus americanus*), grizzly bear (*Ursus arctos*), moose (*Alces alces*),

caribou (*Rangifer tarandus*), wolf (*Canis lupus*), and wolverine (*Gulo gulo*) as big game.

8-2a(1) Bears

Black and grizzly bears are found throughout YTA and TFTA. Both are hunted, although black bears are taken more often due to their larger population.

Black Bear

In 1988 USARAK and ADF&G began a cooperative study of black bear demographics on TFTA (Hechtel, 1991). Between 1988 and 1991, 45 individual bears were captured 111 times. From 1988 to 1990, 29 radio-collared bears were located 916 times. The 29 free-roaming bears caught included 8 adult females (mean age 12 years), 9 subadult females (mean age 3.2 years), 4 adult males (mean age 7.8 years), and 8 subadult males (mean age 2 years). The sightability of nondenning bears during tracking flights was approximately 49%. Mean home range sizes were used to estimate densities of 46-67 bears/1,000 km².

Forty-seven den sites were located. Fifteen den sites were in spruce habitat types, nine in birch/aspen stands, seventeen in alder/willow shrubs, six in heath meadows, and none in marshes. Availability of denning sites is not a limiting factor.

Bear harvest appeared to be directly linked to access, with a mean harvest of 11.2 bears/year from TFTA and 9.8 from YTA during the study period. Overall harvest was judged to be sustainable, although areas in YTA may have localized overharvest. No serious black bear conservation problems were identified related to Fort Wainwright land management.

This study emphasized TFTA due to difficulty in capturing black bears in YTA. Thus, there is little information on this important component of the Unit 20 black bear population. Section 14-3b(2) describes a planned study to fill this data gap.

Since 1974 (when harvested black bears were first required to be sealed), black bear harvest on TFTA has varied from 0 (1975) to 25 (1981), and harvest on YTA has varied from 1 (1979) to 15 (1977) (Hechtel, 1991; Appendix 9-8a). Black bear harvest on TFTA is primarily opportunistic by moose hunt-

ers in fall, while YTA harvest is mostly during spring (Hechtel, 1991). Since 1974, the bag limit has been three bears annually with no closed season.

Bear baiting was closed from 1977 through the 1982-83 season due to conflicts with pipeline construction activity. Since the 1983-84 season, the practice has been legal. Baiters must have permits. Harvest across Unit 20 has generally been higher since re-opening of baiting, but the difference is not statistically significant (Hechtel, 1991). In 1995, virtually all bear hunters (56/1) on Fort Wainwright who reported hunting only on YTA or TFTA used bait stations. Those who did not prefer a specific area did not prefer baiting by a 22/9 majority. All black bears harvested (9) were by hunters who used bait stations. Bear baiting is not as controversial in interior Alaska as in many other areas.

Grizzly Bear

While black bears are increasing in numbers in many parts of the nation, grizzly bear populations are not nearly as secure in many areas. Only a few grizzly bears (0-3 annually during the past five years) are harvested from Fort Wainwright. USARAK has provided over \$100,000 for the study of family relationships and among-population movements (using DNA analysis) and effects of poaching on grizzly (or brown) bears.

Grizzly bears are hunted during all but summer months. The bag limit is one bear every four regulatory years. Grizzly bears may not be taken over bait.

8-2a(2) Moose

Moose is a "featured" wildlife species on Fort Wainwright. Fort Wainwright is included in ADF&G's Game Management Unit 20, which has the state's largest moose harvest. Although not considered good winter moose habitat, TFTA supports high concentrations during spring and fall and is the largest known moose calving area in interior Alaska (Nakata Planning Group, 1987). Moose concentration areas on YTA include Moose Creek and the Chena floodplain in the northwest, Hunts and Horner creeks in the north, the South Fork Chena River drainage and Beaver Creek in the northeast, Nighty-eight Mile Creek in the southeast, and the Little Salcha River drainage as it enters the southern boundary.

Population and harvest data for moose on TFTA is included in Table 8-2a(2), covering a five-year period.

Harvest data on Fort Wainwright (Appendix 9-8a) are reflective of moose populations during the hunting season on the installation. Harvest is relatively insignificant in the Main Post area, so these data are not useful indices for population changes.

8-2a(3) Caribou

*"We have abused both the herd and the land. The land is waiting for an apology. Until then, the herd will not be productive and give itself to people."*⁷

Fort Wainwright is part of the historic range of the Fortymile caribou herd, but rarely are caribou now found on the installation. During the early 1900s, this herd was the largest in Alaska and one of the largest in the world, ranging over 85,000 square miles. In 1920, the herd was estimated at 568,000, but herd size fell to 10,000-20,000 in the 1930s. The herd grew to perhaps 60,000 in 1956, but it decreased to about 6,500 by 1973. This crash was probably due to overharvesting, unfavorable weather, and wolf predation. By 1990, the herd had increased to about 22,000 caribou, and has remained stable (Anonymous, 1995b). Caribou hunting is very limited in Game Management Unit 20, and no caribou have been taken from Fort Wainwright in recent years.

8-2a(4) Wolves

According to the ADF&G, there are four wolf packs on TFTA, two packs on YTA, and three packs on

Fort Greely (see 12-3a(8)). Wolf populations are stable in this area. Hunting wolves is allowed in Unit 20A and 20B from August through April (bag limit of five). Trapping is allowed November 1 through April 30. However, there are few wolves reported taken from Fort Wainwright (see Table 9 in Appendix 9-8a).

8-2a(5) Wolverines

No population estimate for wolverines is available; however, wolverines are considered to be secure. Hunting in Unit 20 occurs from September through March. The bag limit is one wolverine annually. A few wolverines are taken each year by trappers (see Table 9, Appendix 9-8a).

8-2b Small Game

Several small game species, as defined by ADF&G, are found on Fort Wainwright including spruce grouse (*Dendragopus canadensis*), ptarmigan (*Lagopus* sp.), snowshoe hare (*Lepus americanus*), and numerous ducks and geese. Grouse, ducks, hares, and ptarmigans are taken yearly from Fort Wainwright in high numbers, while few geese are taken each year. Game species are included in Appendix 8-2. Population sizes for these species are unknown but are considered to be stable.

Small game seasons and bag limits are within state-wide ADF&G regulations. These also include furbearers and unclassified game species. Species open for hunting on Fort Wainwright are listed in the Small Game Seasons and Bag Limits Table 8-2b.

Table 8-2a(2). Population and Harvest Data for Moose in Game Management Unit 20A (ADF&G)

Season	Bulls / 100 Cows	Yearlings/ 100 Cows	Calves/ 100 Cows	Estimated Population	Hunters	Harvest	Success
1994-95	35	25	52	13,800	1,210	370	31%
1993-94	29, 30*	21	42	12,300	1,154	382	33%
1992-93	28,31,36*	15	39	11,000	982	246	25%
1991-92	22,52*	16	37	11,500	1,121	386	34%
1990-91	23,24,26*	17	52	10,500	1,166	399	34%

* Different areas of Unit 20A.

⁷elder Alex Van Bibber, Yukon

Table 8-2b. Small Game Seasons and Bag Limits, 1995-1996 Regulatory Year

Species	Season	Bag Limit
Coyote	Sept 1- Apr 30	2 Annually
Red Fox	Sept 1- Mar 15	10 Annually, But No More Than 2 Prior to Oct 1
Lynx	Dec 1- Jan 31	2 Annually
Squirrel	No Closed Season	No Limit
Grouse (all)	Aug 10- Mar 31	15 Daily
Hare	No Closed Season	No Limit
Ptarmigan	Aug 10- Apr 30	20 Daily
Bat, Shrew, Rat, Mouse, Porcupine, Raccoon, Starling	No Closed Season	No Limit
Crow, Magpie, Raven	No Open Season	No Allowable Takes

Appendix 9-8a indicates small game harvest on Fort Wainwright. Spruce and ruffed grouse harvests are combined. Together, the population trend for grouse has dramatically increased in recent years. Squirrel harvest has been declining after a 1993-94 high. Hare numbers dropped to very low levels in 1994 and may be starting to recover. Ptarmigan populations appear to be increasing. Duck and goose harvests on Fort Wainwright are reasonably stable.

8-2c Furbearers

Species defined by ADF&G as furbearers include the coyote (*Canis latrans*), lynx (*Lynx canadensis*), red squirrel (*Tamiasciurus hudsonicus*), flying squirrel (*Glaucomys sabrinus*), red fox (*Vulpes vulpes*), weasel (*Mustela* sp.), muskrat (*Ondatra zibeticus*), ground squirrel (*Spermophilus parryii*), marmot (*Marmota caligata*), marten (*Martes americana*), beaver (*Castor canadensis*), mink (*Mustela vison*), hoary marmot (*Marmota caligata*), and woodchuck (*Marmota monax*). The wolf and wolverine are also considered furbearers as well as big game (discussed in this INRMP in big game sections 8-2a(4) and 8-2a(5) respectively). Populations of these furbearers are considered stable. The species most often taken in traps are marten, fox, and lynx (see Table 9 in Appendix 9-8a).

8-2d Nongame Mammals

There are no complete nongame mammal surveys of Fort Wainwright. Known nongame mammals found on Fort Wainwright include voles (*Microtus* sp.), lemmings (*Lemmus* sp.), mice (*Peromyscus* and

Zapus sp.), and shrews (*Sorex* sp.). The little brown bat (*Myotis lucifugus*) can also be found in wooded areas and in abandoned buildings. A list of mammals known to occur on the installation is included in Appendix 8-2.

8-2e Nongame Birds

Some of the most common nongame birds observed on the installation include the alder flycatcher (*Empidonax alnorum*), American kestrel (*Falco sparverius*), hawk owl (*Surnia ulula*), great-horned owl (*Bubo virginianus*), yellow-rumped and orange-crowned warblers (*Dendroica coronata* and *Vermivora celata*), common and hoary redpolls (*Acanthis flammea* and *Carduelis hornemanni*), dark-eyed junco (*Junco hyemalis*), hairy woodpecker (*Picoides villosus*), red-tailed hawk (*Buteo jamaicensis*), mew gull (*Larus canus*), gray jay (*Perisoreus canadensis*), common raven (*Corvus corax*), black-capped chickadee (*Parus atricapillus*), American robin (*Turdus migratorius*), varied thrush (*Ixoreus naevius*), hermit thrush (*Catharus guttata*), Swainson's thrush (*C. ustulatus*), grey-cheeked thrush (*C. minimus*), Bohemian waxwing (*Bombycilla garrulus*), snow bunting (*Plectrophenax nivalis*), and the cliff swallow (*Hirundo pyrrhonota*) (BLM and U.S. Army, 1994; U.S. Army, 1981). Appendix 8-2 lists birds known on the installation.

Data on trumpeter swans was obtained from 1978-1997 surveys. There are considerable fluctuations in both adult and cygnet counts, but the long-term trend is clearly toward increases in both, which is

consistent with interior Alaska as a whole. Existing survey data for areas used by airboats, and data obtained from the proposed survey (Section 12-3a(6)) will be used to determine effects of airboats on trumpeter swan distribution and densities.

8-2f Fish

The Chena and Salcha rivers support Arctic grayling (*Thymallus arcticus*), king salmon (*O. tshawytscha*), chum salmon (*O. keta*), sheefish (*Stenodus leucichthys nelma*), humpback whitefish (*Coregonus pidschian*), round whitefish (*Prosopium cylindraceum*), Arctic lamprey (*Lampetra japonica*), least cisco (*Coregonus sardinella*), Alaska blackfish (*Dallia pectoralis*) burbot (*Lota lota*), longnose sucker (*Catostomus catostomus*), northern pike (*Esox lucius*), slimey sculpin (*Cottus cognatus*), and lake chub (*Couesius plumbeus*). The Chena and Salcha rivers are important spawning areas for summer chum and king salmon. All of these species inhabit the Tanana River seasonally. A list of verified species is in Appendix 8-2.

Only 12 lakes and ponds on Fort Wainwright have the potential to support fish populations due to overwinter loss. River Road Pond (formerly Sage Hill Pond), Monterrey Pond, Weigh Station 1, Weigh Station 2, and Manchu Lake are stocked with fish by ADF&G. More information on stocking fish can be found in Section 14-3b(4).

8-2g Reptiles and Amphibians

Wood frogs (*Rana sylvestris*) are the only amphibians on Fort Wainwright. There are no reptiles.

8-2h Threatened or Endangered, and Species of Special Concern Animals

No federally-listed threatened or endangered animals are resident on Fort Wainwright. The American peregrine falcon (*Falco peregrinus anatum*) was delisted in 1999. Though not known to nest on Fort Wainwright, it is an infrequent migrant. Potential peregrine falcon habitat for feeding or nesting can be found in the Salcha Bluff area (U.S. Army, 1980).

A federally-listed threatened and endangered species in the lower 48 states, the bald eagle (*Haliaeetus leucocephalus*), is locally common. It nests in the Granite Tors in the State Recreation Area area just north of YTA, and possibly along the Tanana River bluffs.

Six birds are listed as species of special concern by the state (Center for Ecological Management of Military Lands, 1998): the gray-cheeked thrush (*Catharus minimus*), blackpoll warbler (*Dendroica striata*), American peregrine falcon, olive-sided flycatcher (*Contopus borealis*), Arctic peregrine falcon (*Falco peregrinus tundrius*), and Townsend's warbler (*D. townsendii*). As noted in 8-2e, the gray-cheeked thrush was commonly noted in recent surveys (BLM and U.S. Army, 1994). All but the Arctic peregrine falcon have been confirmed on Fort Wainwright (Center for Ecological Management of Military Lands, 1998).

Two species confirmed on Fort Wainwright are considered sensitive by the U.S. Forest Service, the American osprey (*Pandion haliaetus carolinensis*) and trumpeter swan (*Cygnus buccinator*). The trumpeter swan is a summer resident known to nest on TFTA.

The U.S. Fish and Wildlife Service, Office of Migratory Bird Management maintains a list of *Migratory Nongame Birds of Management Concern in the United States*. Species listed for Alaska that may occur on Fort Wainwright are Trumpeter swan, Common loon, Northern harrier, Northern goshawk, Olive-sided flycatcher, Alder flycatcher, Gray-cheeked thrush, and Blackpoll warbler.

Eighteen species confirmed on Fort Wainwright are included on the Boreal Partners in Flight Working Group as target or priority species for monitoring because of declines in populations noted across the Americas. There are no legal requirements to manage these species although all migratory bird species are afforded some protection under the Migratory Bird Treaty Act (Ruth Gronquist, BLM).